WHAT IS CLAIMED :

1. A backlighting panel construction having first and second modes of operation, comprising;

an electro-optical panel having a light emission state in which said electro-optical panel emits light, and a light transmission state in which said electro-optical structure is optically transparent; and

state selection means for selecting said light emission state of said electro-optical panel during said first mode, and said light transmission state of said electro-optical panel during said second mode,

wherein during said ~~first~~ mode, said electro-optical structure emits light from said electro-optical panel, and

wherein during said second mode, said electro-optical panel permits light produced from an external source to be transmitted through said electro-optical panel without substantial scattering.

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2. The backlighting panel construction of claim 1, wherein said light producing means comprises a layer of electroluminescent material interposed between first and second optically transparent conducting electrode layers;

wherein said first and second optically transparent conducting electrode layers are disposed against first and second optically transparent panels, respectively; and

wherein said layer of electroluminescent material is optically transparent in said light transmission state.

2 ~~3~~. The backlighting panel construction of claim ~~2~~ 1, wherein said electroluminescent material is aluminum dioxide.

3 ~~4~~. The backlighting panel construction of claim ~~2~~ 1, which further comprises a light reflective surface removably positionable against said electro-optical panel.

4 ~~5~~. The backlighting panel construction of claim ~~2~~ 1, which further comprises a Fresnel lens structure physically affixed to said electro-optical panel.

5 ~~6~~. The backlighting panel construction of claim ~~2~~ 1, which further comprises a programmable spatial mask affixed to said backlighting panel construction.

6 ~~7~~. The backlighting panel construction of claim ~~6~~ 5, which further comprises an optically transparent touch-screen panel adjacent said programmable spatial light mask, wherein said ~~wherein said~~ optically transparent touch-screen panel comprises:

a writing panel made of optically transparent material and having a first and second surfaces, said writing panel being deformable in response to the application of pressure on said first surface as a writing stylus is moved over said first surface;

a base panel disposed adjacent said writing panel, made from optically transparent material and having first and second surfaces, said second surface being disposed adjacent said spatial light mask;

a plurality of optically transparent conductive strips applied to the second surface of said writing panel, each said optically transparent conductive strip extending parallel to every other said optically transparent conductive strip and corresponding to a prespecified coordinate value along a first coordinate direction in a two dimensional array represented along the writing surface of said writing panel, said two dimensional array also having a second coordinate direction;

an optically transparent conductive layer applied to the first surface of said base panel;

a viscous material disposed between said plurality of optically transparent conductive strips and said optically transparent conductive layer, said viscous layer containing microscopic spheres made of substantially non-conductive material and being free to move within said viscous material in response to said application of pressure by said writing stylus, so as to permit a selected one of said optically transparent conductive strips establish contact with said optically transparent conductive layer and permit electrical current to flow therebetween;

first coordinate determining means for determining the coordinate value along said first coordinate direction when said selected one of said optically transparent conductive strips establishes contact with said optically transparent conductive layer; and

second coordinate determining means for measuring said electrical current flow, and converting the measurement thereof into

a second coordinate value along the second coordinate direction of said two-dimensional array.

8. The backlighting panel construction of claim 1, wherein said electro-optical panel comprises:

light producing means for producing light during said light emission state;

a light guiding structure having first and second light guiding surfaces between which said produced light can be totally internally reflected;

a light diffusing structure operably associated with said light guiding structure, said light diffusing structure having a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode;

wherein said state selection means comprises means for selecting said light scattering state of operation during said first mode, and for selecting said light non-scattering state of operation during said second mode,

wherein during said first mode, said light diffusing structure scatters light internally reflected within said light guiding structure and permits at least a portion of said scattered light to be transmitted through said first light guiding surface of said light guiding structure and said light diffusing structure, and

wherein during said second mode, said light diffusing structure permits light produced from an external source to be transmitted through the second and first light guiding surfaces of said light

guiding structure and through said light diffusing structure without substantial scattering.

9. The backlighting panel construction of claim 8, wherein said light guiding panel further comprises a first light conducting edge through which light produced from said light producing means can be transmitted into said light guiding structure for total internal reflection between said first and second light guiding surfaces.

10. The backlighting panel construction of claim 8, which further comprises a light reflective surface removeably positionable at a distance from said second light guiding surface of said light guiding structure.

11. The backlighting panel construction of claim 8, wherein said light diffusing structure comprises a polymer-dispersed liquid crystal panel having optically transparent electrode surfaces.

12. The backlighting panel construction of claim 8, wherein said light diffusing structure comprises:

a first electro-optical light diffusing panel having first and second light transmission surfaces and a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode, said first light transmission surface being in direct physical contact with said second light guiding surface of said light guiding structure;

a second electro-optical light diffusing panel having third and fourth light transmission surfaces and a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode, said third light transmission surface of said second electro-optical light diffusing panel being physically spaced apart from said second light transmission surface of said first electro-optical light diffusing panel, by a first ultra-thin air gap; and

a third electro-optical light diffusing panel having fifth and sixth light transmission surfaces and a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode, said sixth light transmission surface of said third electro-optical light diffusing panel being physically spaced apart from said second light guiding surface of said light guiding structure, by a second ultra-thin air gap.

13. The backlighting panel construction of claim 12, which further comprises a light reflective surface removably positionable against said third electro-optical light diffusing panel.

14. The backlighting panel construction of claim 12, which further comprises a Fresnel lens structure physically affixed to said third electro-optical light diffusing panel.

15. The backlighting panel construction of claim 12,

wherein said first electro-optical light diffusing panel is a first electrically-controlled polymer-dispersed liquid crystal panel having a first pair of optically transparent electrode surfaces across which a first electric field is applied under the control of said state selection means;

wherein said second electro-optical light diffusing panel is a second electrically-controlled polymer-dispersed liquid crystal panel having a second pair of optically transparent electrode surfaces across which a second electric field is applied under the control of said state selection means; and

wherein said third electro-optical light diffusing panel is a third electrically-controlled polymer-dispersed liquid crystal panel having a third pair of optically transparent electrode surfaces across which a third electric field is applied under the control of said state selection means.

16. The display panel assembly of claim 14,

wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a patterned distribution of liquid crystal molecules which in response to said first electric field selectively scatters light along said first light guiding surface of said light guiding structure;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a

substantially uniform light intensity distribution emanates therefrom in the direction of said programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said light guiding structure.

17. The backlighting panel construction of claim 16,

wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules, and said first optically transparent electrode surface includes first and second sets of interleaved electrode strips extending substantially parallel to each other, and said first electric field is applied across only said first set of electrode strips and said second electrode layer during said direct viewing mode so that the liquid crystal molecules beneath said second set of electrode strips are randomly oriented and scatter light during said direct viewing mode, and

wherein said first electric field is applied across both said first and second sets of interleaved electrode strips and said second electrode layer during said projection viewing mode so that the liquid crystal molecules beneath said first and second sets of interleaved electrode strips are substantially aligned with said first electric field to permit light to pass through said first electrically-

controlled polymer-dispersed liquid crystal panel without substantial scattering during said projection viewing mode;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said electrically programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said light guiding structure.

18. The backlighting panel construction of claim 17, wherein said light guiding structure is made from a optically transparent plastic.

19. The backlighting panel construction of claim 8, wherein said light guiding structure comprises first and second light conducting edges, and wherein said light producing means comprises first and second fluorescent tubes disposed along said first and second light conducting edges, respectively, said first and second fluorescent tubes producing and transmitting light through said first and second

light conducting edges during said first mode and for internal reflection between said first ands second light guiding surfaces.

20. The backlighting panel construction of claim 8, which further comprises first and second light focusing elements disposed in proximity with said first and second fluorescent tubes, respectively, for focusing light produced from said first and second fluorescent tubes and directing said focused light across said first and second light conducting edges and into said light guiding structure.

21. The backlighting panel construction of claim 8, which further comprises an optically transparent touch-screen panel adjacent said programmable spatial light mask, wherein said wherein said optically transparent touch-screen panel comprises:

a writing panel made of optically transparent material and having a first and second surfaces, said writing panel being deformable in response to the application of pressure on said first surface as a writing stylus is moved over said first surface;

a base panel disposed adjacent said writing panel, made from optically transparent material and having first and second surfaces, said second surface being disposed adjacent said spatial light mask;

a plurality of optically transparent conductive strips applied to the second surface of said writing panel, each said optically transparent conductive strip extending parallel to every other said optically transparent conductive strip and corresponding to a prespecified coordinate value along a first coordinate direction in a two dimensional array represented along the writing surface of said

writing panel, said two dimensional array also having a second coordinate direction;

an optically transparent conductive layer applied to the first surface of said base panel;

a viscous material disposed between said plurality of optically transparent conductive strips and said optically transparent conductive layer, said viscous layer containing microscopic spheres made of substantially non-conductive material and being free to move within said viscous material in response to said application of pressure by said writing stylus, so as to permit a selected one of said optically transparent conductive strips establish contact with said optically transparent conductive layer and permit electrical current to flow therebetween;

first coordinate determining means for determining the coordinate value along said first coordinate direction when said selected one of said optically transparent conductive strips establishes contact with said optically transparent conductive layer; and

second coordinate determining means for measuring said electrical current flow, and converting the measurement thereof into a second coordinate value along the second coordinate direction of said two-dimensional array.

22. A backlighting panel construction having first and second modes of operation, comprising

light producing means for producing light during said first mode;

a light guiding structure having first and second light guiding surfaces between which said produced light can be totally internally reflected;

a light diffusing structure operably associated with said light guiding structure, having a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode; and

state selection means for selecting said light scattering state of operation for said light diffusing structure during said first mode, and for selecting said light non-scattering state of operation for said light diffusing structure during said second mode,

wherein during said first mode, said light diffusing structure scatters light reflected within said light guiding structure and permits a portion of said scattered light to be transmitted through said first light guiding surface of said light guiding structure and said light diffusing structure, and

wherein during said second mode, said light diffusing structure permits light produced from an external source to be transmitted through the second and first light guiding surfaces of said light guiding structure and through said light diffusing structure without substantial scattering.

23. The backlighting panel construction of claim 22, wherein said light guiding panel further comprises a first light conducting edge through which light produced from said light producing means can be transmitted into said light guiding structure for total internal reflection between said first and second light guiding surfaces.

24. The backlighting panel construction of claim 23, which further comprises a light reflective surface removeably positionable at a distance from said second light guiding surface of said light guiding structure.

25. The backlighting panel construction of claim 22, wherein said light diffusing structure comprises a polymer-dispersed liquid crystal panel having optically transparent electrode surfaces.

26. The backlighting panel construction of claim 22, wherein said light diffusing structure comprises:

a first electro-optical light diffusing panel having first and second light transmission surfaces and a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode, said first light transmission surface being in direct physical contact with said second light guiding surface of said light guiding structure;

a second electro-optical light diffusing panel having third and fourth light transmission surfaces and a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode, said third light transmission surface of said second electro-optical light diffusing panel being physically spaced apart from said second light transmission surface of said first electro-optical light diffusing panel, by a first ultra-thin air gap; and

a third electro-optical light diffusing panel having fifth and sixth light transmission surfaces and a light scattering state of operation selectable during said first mode, and a light non-scattering state of operation selectable during said second mode, said sixth light transmission surface of said third electro-optical light diffusing panel being physically spaced apart from said second light guiding surface of said light guiding structure, by a second ultra-thin air gap.

27. The backlighting panel construction of claim 26, which further comprises a light reflective surface removably positionable against said third electro-optical light diffusing panel.

28. The backlighting panel construction of claim 26, which further comprises a Fresnel lens structure physically affixed to said third electro-optical light diffusing panel.

29. The backlighting panel construction of claim 26,

wherein said first electro-optical light diffusing panel is a first electrically-controlled polymer-dispersed liquid crystal panel having a first pair of optically transparent electrode surfaces across which a first electric field is applied under the control of said state selection means;

wherein said second electro-optical light diffusing panel is a second electrically-controlled polymer-dispersed liquid crystal panel having a second pair of optically transparent electrode surfaces

across which a second electric field is applied under the control of said state selection means; and

wherein said third electro-optical light diffusing panel is a third electrically-controlled polymer-dispersed liquid crystal panel having a third pair of optically transparent electrode surfaces across which a third electric field is applied under the control of said state selection means.

30. The display panel assembly of claim 29,

wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a patterned distribution of liquid crystal molecules which in response to said first electric field selectively scatters light along said first light guiding surface of said light guiding structure;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially

uniform light intensity distribution emanates therefrom in the direction of said light guiding structure.

31. The backlighting panel construction of claim 30,

wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules, and said first optically transparent electrode surface includes first and second sets of interleaved electrode strips extending substantially parallel to each other, and said first electric field is applied across only said first set of electrode strips and said second electrode layer during said direct viewing mode so that the liquid crystal molecules beneath said second set of electrode strips are randomly oriented and scatter light during said direct viewing mode, and

wherein said first electric field is applied across both said first and second sets of interleaved electrode strips and said second electrode layer during said projection viewing mode so that the liquid crystal molecules beneath said first and second sets of interleaved electrode strips are substantially aligned with said first electric field to permit light to pass through said first electrically-controlled polymer-dispersed liquid crystal panel without substantial scattering during said projection viewing mode;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a

substantially uniform light intensity distribution emanates therefrom in the direction of said electrically programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said light guiding structure.

32. The backlighting panel construction of claim 31, wherein said light guiding structure is made from a optically transparent plastic.

33. The backlighting panel construction of claim 22, wherein said light guiding structure comprises first and second light conducting edges, and wherein said light producing means comprises first and second fluorescent tubes disposed along said first and second light conducting edges, respectively, said first and second fluorescent tubes producing and transmitting light through said first and second light conducting edges during said first mode.

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~~35~~. The backlighting panel construction of claim 33, which further comprises first and second light focusing elements disposed in proximity with said first and second fluorescent tubes, respectively, for focusing light produced from said first and second fluorescent

tubes and directing said focused light across said first and second light conducting edges and into said light guiding structure.

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~~34~~. The display panel construction of claim 22, which further comprises an optically transparent touch-screen panel adjacent said programmable spatial light mask, wherein said wherein said optically transparent touch-screen panel comprises:

a writing panel made of optically transparent material and having a first and second surfaces, said writing panel being deformable in response to the application of pressure on said first surface as a writing stylus is moved over said first surface;

a base panel disposed adjacent said writing panel, made from optically transparent material and having first and second surfaces, said second surface being disposed adjacent said spatial light mask;

a plurality of optically transparent conductive strips applied to the second surface of said writing panel, each said optically transparent conductive strip extending parallel to every other said optically transparent conductive strip and corresponding to a prespecified coordinate value along a first coordinate direction in a two dimensional array represented along the writing surface of said writing panel, said two dimensional array also having a second coordinate direction;

an optically transparent conductive layer applied to the first surface of said base panel;

a viscous material disposed between said plurality of optically transparent conductive strips and said optically transparent conductive layer, said viscous layer containing microscopic spheres

made of substantially non-conductive material and being free to move within said viscous material in response to said application of pressure by said writing stylus, so as to permit a selected one of said optically transparent conductive strips establish contact with said optically transparent conductive layer and permit electrical current to flow therebetween;

first coordinate determining means for determining the coordinate value along said first coordinate direction when said selected one of said optically transparent conductive strips establishes contact with said optically transparent conductive layer; and

second coordinate determining means for measuring said electrical current flow, and converting the measurement thereof into a second coordinate value along the second coordinate direction of said two-dimensional array.

36. An image display device having direct and projection viewing modes of operation, said image display device comprising:

light producing means for producing light during said direct viewing mode;

a light guiding structure formed from optically transparent material, said light guiding structure having first and second light guiding surfaces, and a first light conducting edge through which light produced from said light producing means can be transmitted into said light guiding structure for total internal reflection between said first and second light guiding surfaces;

a light diffusing structure operably associated with said light guiding structure, said light diffusing structure having a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection viewing mode;

a spatial light mask, disposed adjacent said light diffusing structure, being optically transparent during said projection viewing mode, and having means for spatially modulating the intensity of light transmitted through said light diffusing structure; and

state selection means for selecting said light scattering state of operation for said light diffusing structure during said direct viewing mode, and for selecting said light non-scattering state of operation for said light diffusing structure during said projection viewing mode,

wherein during said direct viewing mode, said light diffusing structure scatters light reflected within said light guiding structure and a portion of said scattered light is transmitted through said first light guiding surface of said light guiding structure and said light diffusing structure, onto said spatial light mask, and

wherein during said projection viewing mode, said light diffusing structure permits light produced from an external source to be transmitted through the second and first light guiding surfaces of said light guiding structure and through said light diffusing structure without substantial scattering, onto said spatial light mask, for spatial intensity modulation of said transmitted light.

37. The image display device of claim 36, which further comprises a light reflective surface removably positionable at a distance from said second light guiding surface of said light guiding structure.

38. The image display device of claim 36, wherein said light diffusing structure comprises a polymer-dispersed liquid crystal panel having optically transparent electrode surfaces.

39. The image display device of claim 36, wherein said spatial light mask includes a display surface for displaying a composite pixel pattern representative of a spatially multiplexed image composed of first and second spatially modulated perspective images of a 3-D object, said first spatially modulated perspective image consisting of a first pixel pattern representative of a first perspective image of said 3-D object spatially modulated according to a first spatial modulation pattern, said second spatially modulated perspective image consisting of a second pixel pattern representative of a second perspective image of said 3-D object spatially modulated according to a second spatial modulation pattern, said second spatial modulation pattern being a logical complement of said first spatial modulation pattern, and

wherein said display panel assembly further comprises a micropolarization panel comprising a optically transparent sheet directly mounted onto said display surface of said spatial light mask, said optically transparent sheet having first and second optically transparent patterns permanently formed in said first optically transparent sheet, said first optically transparent pattern spatially

corresponding to and being spatially aligned with said first pixel pattern so as to impart a first polarization state P_1 to said first pixel pattern, and said second optically transparent pattern spatially corresponding to and being spatially aligned with said second pixel pattern so as to impart a second polarization state P_2 to said second pixel pattern, said second polarization state P_2 being different than said first polarization state P_1, and each of said first and second optically transparent patterns having a spatial period of less than about 500 microns.

40. The image display device of claim 39, wherein said spatial light mask is electrically programmable.

41. The image display device of claim 36, wherein said spatial light mask is electrically programmable, and said light diffusing structure comprises:

a first electro-optical light diffusing panel having first and second light transmission surfaces and a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection viewing mode, said first light transmission surface being in direct physical contact with said second light guiding surface of said light guiding structure;

a second electro-optical light diffusing panel having third and fourth light transmission surfaces and a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection

viewing mode, said third light transmission surface of said second electro-optical light diffusing panel being physically spaced apart from said second light transmission surface of said first electro-optical light diffusing panel, by a first ultra-thin air gap, and said fourth light transmission surface of said second electro-optical light diffusing panel being adjacent said spatial light mask; and

a third electro-optical light diffusing panel having fifth and sixth light transmission surfaces and a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection viewing mode, said sixth light transmission surface of said third electro-optical light diffusing panel being physically spaced apart from said first light guiding surface of said light guiding structure, by a second ultra-thin air gap.

42. The image display device of claim 41, which further comprises a light reflective surface removably positionable adjacent said fifth light transmission surface of said third electro-optical light diffusing panel

43. The image display device of claim 41, which further comprises a Fresnel lens structure physically affixed to said third electro-optical light diffusing panel.

44. The image display device of claim 41,

wherein said spatial light mask is electrically programmable;

wherein said first electro-optical light diffusing panel is a first electrically-controlled polymer-dispersed liquid crystal panel having a first pair of optically transparent electrode surfaces across which a first electric field is applied under the control of said state selection means;

wherein said second electro-optical light diffusing panel is a second electrically-controlled polymer-dispersed liquid crystal panel having a second pair of optically transparent electrode surfaces across which a second electric field is applied under the control of said state selection means; and

wherein said third electro-optical light diffusing panel is a third electrically-controlled polymer-dispersed liquid crystal panel having a third pair of optically transparent electrode surfaces across which a third electric field is applied under the control of said state selection means.

45. The image display device of claim 44, which further comprises a display control means for controlling the spatial intensity of light emanating from said electrically programmable spatial light mask, and

wherein said electrically programmable spatial light mask comprises a liquid crystal display panel comprising an array of electrically addressable pixels, each said pixel having a light transmittance that is controllable by said display control means.

46. The image display device of claim 44,

wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a patterned distribution of liquid crystal molecules which in response to said first electric field selectively scatters light along said first light guiding surface of said light guiding structure;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emerges therefrom in the direction of said electrically programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said light guiding structure.

47. The image display device of claim 44,

wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules, and said first optically transparent electrode surface includes first and second sets of interleaved electrode strips extending substantially parallel to each other, and said first electric

field is applied across only said first set of electrode strips and said second electrode layer during said direct viewing mode so that the liquid crystal molecules beneath said second set of electrode strips are randomly oriented and scatter light during said direct viewing mode, and

wherein said first electric field is applied across both said first and second sets of interleaved electrode strips and said second electrode layer during said projection viewing mode so that the liquid crystal molecules beneath said first and second sets of interleaved electrode strips are substantially aligned with said first electric field to permit light to pass through said first electrically-controlled polymer-dispersed liquid crystal panel without substantial scattering during said projection viewing mode;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said electrically programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially

uniform light intensity distribution emanates therefrom in the direction of said light guiding structure.

48. The image display device of claim 44, wherein said light guiding structure is made from an optically transparent panel.

49. The image display device of claim 36, wherein said light guiding structure comprises first and second light conducting edges, and wherein said light producing means comprises first and second fluorescent tubes disposed along said first and second light conducting edges, respectively, said first and second fluorescent tubes producing and transmitting light through said first and second light conducting edges during said direct viewing mode.

50. The image display device of claim 49, which further comprises first and second light focusing elements disposed in proximity with said first and second fluorescent tubes, respectively, for focusing light produced from said first and second fluorescent tubes and directing said focused light across said first and second light conducting edges and into said light guiding structure.

51. The image display device of claim 36, which further comprises a Fresnel lens structure adjacent said light guiding structure.

52. The image display device of claim 51, wherein said Fresnel lens is affixed to said light diffusing structure.

53. The image display device of claim 51, in combination with a portable light projection device, said portable light projection device comprising:

a first housing portion containing a light producing means for producing visible light, and a light focusing means for focusing and directing said produced visible light through said display panel assembly for optical processing and conversion into an image on the display surface of said spatial light mask;

a second housing portion having an image projecting lens for projecting onto a viewing surface, the image displayed on the display surface of said display panel assembly; and

a reconfigurable structure operably connecting said first and second housing portions, said reconfigurable structure being positionable about said display panel housing when said portable light projecting device is used in conjunction with said image display device, and permitting said first and second housing portions to be brought together into a compact arrangement when said portable light projecting device is being stored or transported.

54. The image display device of claim 54, which further comprises a light polarizing filter disposed in said first housing portion, for imparting a selected polarization state to visible light transmitted through said display panel assembly.

55. The image display device of claim 54, which further comprises a portable housing having a light transmission aperture though which said unitary display panel assembly is supported.

56. The image display device of claim 36, wherein said light producing means, said light guiding structure and said light diffusing structure form a unitary display panel assembly.

57. The image display device of claim 36, which further comprises an optically transparent touch- screen panel disposed adjacent said spatial light
mask.

58. The image display device of claim 57, wherein said optically transparent touch-screen panel comprises:

a writing panel made of optically transparent material and having a first and second surfaces, said writing panel being deformable in response to the application of pressure on said first surface by a writing stylus being moved over said first surface;

a base panel disposed adjacent said writing panel, made from optically transparent material and having first and second surfaces, said second surface being disposed adjacent said spatial light mask;

a plurality of optically transparent conductive strips applied to the second surface of said writing panel, each said optically transparent conductive strip extending substantially parallel to every other said optically transparent conductive strip and corresponding to a prespecified coordinate value along a first coordinate direction in a two dimensional array represented along the writing surface of said writing panel and also having a second coordinate direction;

an optically transparent conductive layer applied to the first surface of said base panel;

a viscous material disposed between said plurality of optically transparent conductive strips and said optically transparent conductive layer, said viscous layer containing microscopic spheres made of substantially non-conductive material and being free to move within said viscous material in response to said application of pressure by said writing stylus, so as to permit a selected one of said optically transparent conductive strips establish contact with said optically transparent conductive layer and permit electrical current to flow therebetween;

first coordinate determining means for determining the coordinate value along said first coordinate direction when said selected one of said optically transparent conductive strips establishes contact with said optically transparent conductive layer; and

second coordinate determining means for measuring said electrical current flow, and converting the measurement thereof into a second coordinate value along the second coordinate direction of said two-dimensional array.

59. The image display device of claim 36, which further comprises an optically transparent touch- screen panel adjacent said spatial light mask, wherein said optically transparent touch-screen panel comprises:

a writing panel made of optically transparent material and having a first and second surfaces, said writing panel being

deformable in response to the application of pressure on said first surface by a writing stylus being moved over said first surface;

a base panel disposed adjacent said writing panel, made from optically transparent material and having first and second surfaces, said second surface being disposed adjacent said spatial light mask;

a plurality of optically transparent conductive strips applied to the second surface of said writing panel, each said optically transparent conductive strip extending substantially parallel to every other said optically transparent conductive strip and corresponding to a prespecified coordinate value along a first coordinate direction in a two dimensional array represented along the writing surface of said writing panel and also having a second coordinate direction;

an optically transparent conductive layer applied to the first surface of said base panel;

a viscous material disposed between said plurality of optically transparent conductive strips and said optically transparent conductive layer, said viscous layer containing microscopic spheres made of substantially non-conductive material and being free to move within said viscous material in response to said application of pressure by said writing stylus, so as to permit a selected one of said optically transparent conductive strips establish contact with said optically transparent conductive layer and permit electrical current to flow therebetween;

first coordinate determining means for determining the coordinate value along said first coordinate direction when said selected one of said optically transparent conductive strips

establishes contact with said optically transparent conductive layer; and

second coordinate determining means for measuring said electrical current flow, and converting the measurement thereof into a second coordinate value along the second coordinate direction of said two-dimensional array.

60. The image display device of claim 59, in combination with polarization glasses.

61. A portable computer-based system having direct and projection viewing modes of operation, comprising:

a housing of compact construction;

data storage means, disposed in said housing, for storing data representative of one or more images; and

a display panel assembly, supported within said housing, and having direct and projection viewing modes of operation,

said display panel assembly including

light producing means for producing light during said direct viewing mode,

a light guiding structure having first and second light guiding surfaces between which said produced light can be totally internally reflected during said direct viewing mode,

a light diffusing structure operably associated with said light guiding structure, said light diffusing structure having a light scattering state of operation selectable during said direct viewing

mode, and a light non-scattering state of operation selectable during said projection viewing mode,

a programmable spatial light mask, disposed in direct physical contact with said light diffusing structure, being optically transparent during said projection viewing mode, and including means for spatially modulating the intensity of light transmitting from said light diffusing structure and through said programmable spatial light mask, and

state selection means for selecting said light scattering state of operation for said light diffusing structure during said direct viewing mode, and for selecting said light non-scattering state of operation for said light diffusing structure during said projection viewing mode,

wherein during said light scattering state of operation, said light diffusing structure scatters light reflected within said light guiding structure and a portion of said scattered light is transmitted through said first light guiding surface of said light guiding structure and said light diffusing structure, onto said programmable spatial light mask, and

wherein during said projection viewing mode, said light diffusing structure permits light produced from an external source to be transmitted through the second and first light guiding surfaces of said light guiding structure and through said light diffusing structure without substantial scattering, onto said programmable spatial light mask, for spatial intensity modulation of said transmitted light.

62. The portable computer-based system of claim 61, wherein said light guiding structure further comprises a first light conducting edge through which light produced from said light producing means can be transmitted into said light guiding structure for total internal reflection between said first and second light guiding surfaces.

63. The portable computer-based system of claim 61, wherein said display panel assembly is in the form of a unitary structure.

64. The portable computer-based system of claim 61, which further comprises a light reflective surface removably positionable at a distance from said first light guiding surface of said light guiding structure.

65. The portable computer-based system of claim 61, wherein said light diffusing structure comprises a polymer-dispersed liquid crystal panel having optically transparent electrode surfaces.

66. The portable computer-based system of claim 61, wherein said programmable spatial light mask includes a display surface for displaying a composite pixel pattern representative of a spatially multiplexed image composed of first and second spatially modulated perspective images of a 3-D object, said first spatially modulated perspective image consisting of a first pixel pattern representative of a first perspective image of said 3-D object spatially modulated according to a first spatial modulation pattern, said second spatially modulated perspective image consisting of a second pixel pattern

representative of a second perspective image of said 3-D object spatially modulated according to a second spatial modulation pattern, said second spatial modulation pattern being a logical complement of said first spatial modulation pattern, and

wherein said electro-optical display panel assembly further comprises a micropolarization panel comprising a optically transparent sheet directly mounted onto said display surface of said programmable spatial light mask, said optically transparent sheet having first and second optically transparent patterns permanently formed in said first optically transparent sheet, said first optically transparent pattern spatially corresponding to and being spatially aligned with said first pixel pattern so as to impart a first polarization state P_1 to said first pixel pattern, and said second optically transparent pattern spatially corresponding to and being spatially aligned with said second pixel pattern so as to impart a second polarization state P_2 to said second pixel pattern, said second polarization state P_2 being different than said first polarization state P_1, and each of said first and second optically transparent patterns having a spatial period of less than about 500 microns.

67. The portable computer-based system of claim 61, wherein said light diffusing structure comprises:

a first electro-optical light diffusing panel having first and second light transmission surfaces and a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection viewing mode, said first light transmission surface being in direct

physical contact with said second light guiding surface of said light guiding structure;

a second electro-optical light diffusing panel having third and fourth light transmission surfaces and a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection viewing mode, said third light transmission surface of said second electro-optical light diffusing panel being physically spaced apart from said second light transmission surface of said first electro-optical light diffusing panel, by a first ultra-thin air gap, and said fourth light transmission surface of said second electro-optical light diffusing panel being adjacent said programmable spatial light mask; and

a third electro-optical light diffusing panel having fifth and sixth light transmission surfaces and a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection viewing mode, said sixth light transmission surface of said third electro-optical light diffusing panel being physically spaced apart from said first light guiding surface of said light guiding structure, by a second ultra-thin air gap.

68. The portable computer-based system of claim 67, which further comprises a light reflective surface removably positionable against said third electro-optical light diffusing structure.

69. The portable computer-based system of claim [illegible], wherein said electro-optical display panel assembly further comprises a Fresnel lens structure physically affixed to said third electro-optical light diffusing panel.

70. The portable computer-based system of claim 67,

wherein said first electro-optical light diffusing panel is a first electrically-controlled polymer-dispersed liquid crystal panel having a first pair of optically transparent electrode surfaces across which a first electric field is applied under the control of said state selection means;

wherein said second electro-optical light diffusing panel is a second electrically-controlled polymer-dispersed liquid crystal panel having a second pair of optically transparent electrode surfaces across which a second electric field is applied under the control of said state selection means; and

wherein said third electro-optical light diffusing panel is a third electrically-controlled polymer-dispersed liquid crystal panel having a third pair of optically transparent electrode surfaces across which a third electric field is applied under the control of said state selection means.

71. The portable computer-based system of claim 61, which further comprises a display control means for controlling the spatial intensity of light emerging from said programmable spatial light mask, and

wherein said programmable spatial light mask comprises a liquid crystal display panel comprising an array of electrically addressable pixels, each said pixel having a light transmittance that is controllable by said display control means.

72. The portable computer-based system of claim 70,

wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a patterned distribution of liquid crystal molecules which in response to said first electric field selectively scatters light along said first light guiding surface of said light guiding structure;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emerges therefrom in the direction of said programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emerges therefrom in the direction of said light guiding structure.

73. The portable computer-based system of claim [illegible]0, wherein said first electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules, and

wherein said first optically transparent electrode surface includes first and second sets of interleaved electrode strips extending substantially parallel to each other, and said first electrical field is applied across only said first set of electrode strips and said second electrode layer during said direct viewing mode so that the liquid crystal molecules beneath said second set of electrode strips are randomly oriented and scatter light during said direct viewing mode, and

wherein said first electrical field is applied across both said first and second sets of interleaved electrode strips and said second electrode layer during said projection viewing mode so that the liquid crystal molecules beneath said first and second sets of interleaved electrode strips are substantially aligned with said first electrical field to permit light to pass through said first electrically-controlled polymer-dispersed liquid crystal panel without substantial scattering during said projection viewing mode;

wherein said second electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said second electric field selectively scatters light within said second electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said programmable spatial light mask; and

wherein said third electrically-controlled polymer-dispersed liquid crystal panel contains a substantially uniform distribution of liquid crystal molecules which in response to said third electric field selectively scatters light within said third electrically-controlled polymer-dispersed liquid crystal panel so that a substantially uniform light intensity distribution emanates therefrom in the direction of said light guiding structure.

74. The portable computer-based system of claim 70, wherein said light guiding structure is made from a optically transparent plastic.

75. The portable computer-based system of claim 67, wherein said light guiding structure comprises first and second light conducting edges, and wherein said light producing means comprises first and second fluorescent tubes disposed along said first and second light conducting edges, respectively, said first and second fluorescent tubes producing and transmitting light through said first and second light conducting edges during said direct viewing mode.

76. The portable computer-based system of claim 75, wherein said electro-optical display panel assembly further comprises first and second light focusing elements disposed in proximity with said first and second fluorescent tubes, respectively, for focusing light produced from said first and second fluorescent tubes and directing said focused light across said first and second light conducting edges and into said light guiding structure.

77. A portable light projection device for use with a portable computer system having a base portion, and a display portion hingedly connected to said base portion and having a light transmission aperture formed therethrough for supporting a display panel assembly having a display surface, said portable light projection device comprising:

a first housing portion containing a light producing means for producing visible light, and a light focusing means for focusing and directing said produced visible light through said light aperture and onto said display panel assembly for optical processing and conversion into an image on the display surface of said display panel assembly;

a second housing portion having an image projecting lens for projecting onto a viewing surface, the image displayed on the display surface of said display panel assembly; and

a reconfigurable structure operably connecting said first and second housing portions, said reconfigurable structure being positionable about the base portion of said computer system when said portable light projecting device is being used in conjunction with said portable computer system, and permitting said first and second housing portions to be brought together into a compact arrangement when said portable light projecting device is being stored or transported.

78. The portable light projection device of claim 77, which further comprises a light polarizing filter disposed in said first housing portion, for imparting a selected polarization state to visible light

transmitted through said light aperture and onto said display panel assembly.

79. A portable light projection device for use with portable image display system having direct and projection viewing modes of operation, a display panel assembly having a display surface, and a portable housing having a light transmission aperture formed therethrough for supporting said display panel assembly, said portable light projection device comprising:

a first housing portion containing a light producing means for producing visible light, and a light focusing means for focusing and directing said produced visible light through said light aperture and onto said display panel assembly for optical processing and conversion into an image on the display surface of said display panel;

a second housing portion having an image projecting lens for projecting onto a viewing surface, the image displayed on the display surface of said display panel assembly; and

a reconfigurable structure operably connecting said first and second housing portions, said reconfigurable structure being positionable about the portable housing of said portable image display system when said portable image display system is operated in said projection viewing mode, and permitting said first and second housing portions to be brought together into a compact arrangement when said portable light projecting device is being stored or transported.

80. The portable light projection device of claim [illegible], which further comprises a light polarizing filter disposed in said first housing portion, for imparting a selected polarization state to visible light transmitted through said light aperture and onto said display panel assembly.

81. The image display system having direct and projection viewing modes of operation, comprising:

(A) an image display device including

(i) a portable housing having a light transmission aperture formed therethrough, and

(ii) a display panel assembly supported within said light transmission aperture, and including

light producing means for producing light during said direct viewing mode,

a light guiding structure formed from optically transparent material, said light guiding structure having first and second light guiding surfaces, and a first light conducting edge through which light produced from said light producing means can be transmitted into said light guiding structure for total internal reflection between said first and second light guiding surfaces,

a light diffusing structure operably associated with said light guiding structure, said light diffusing structure having a light scattering state of operation selectable during said direct viewing mode, and a light non-scattering state of operation selectable during said projection viewing mode,

a programmable spatial light mask, disposed adjacent said light diffusing structure, and having a display surface and means for spatially modulating the intensity of light transmitted through said light diffusing structure and said programmable spatial light mask, and

state selection means for selecting said light scattering state of operation for said light diffusing structure during said direct viewing mode, and for selecting said light non-scattering state of operation for said light diffusing structure during said projection viewing mode,

wherein during said direct viewing mode, said light diffusing structure scatters light reflected within said light guiding structure and a portion of said scattered light is transmitted through said first light guiding surface of said light guiding structure and said light diffusing structure, onto said programmable spatial light mask, and

wherein during said projection viewing mode, said light diffusing structure permits light produced from an external source to be transmitted through the second and first light guiding surfaces of said light guiding structure and through said light diffusing structure without substantial scattering, onto said programmable spatial light mask, for spatial intensity modulation of said transmitted light; and

(B) a portable light projection device for use with said portable image display system, said portable light projection device including

a first housing portion containing a light producing means for producing visible light, and a light focusing means for focusing and directing said produced visible light through said light aperture and onto said display panel assembly for optical processing and

conversion into an image on the display surface of said display panel assembly,

a second housing portion having an image projecting lens for projecting onto a viewing surface, the image displayed on the display surface of said display panel assembly, and

a reconfigurable structure operably connecting said first and second housing portions, said reconfigurable structure being positionable under the portable housing of said portable image display system when said portable image display system is operated in said projection viewing mode, and permitting said first and second housing portions to be brought together into a compact arrangement when said portable light projecting device is being stored or transported.

82. The portable light projection device of claim 81, which further comprises a light polarizing filter disposed in said first housing portion, for imparting a selected polarization state to visible light transmitted through said light aperture and onto said display panel assembly.

83. A portable computer-based system comprising:

a housing having a base portion, and a display portion hingedly connected to said base portion and having a light transmission aperture;

an display panel assembly supported through said light transmission aperture, and having a display surface; and

a portable light projection device including

a first housing portion containing a light producing means for producing visible light, and a light focusing means for focusing and directing said produced visible light through said light aperture and onto said display panel assembly for optical processing and conversion into an image on the display surface of said display panel,

a second housing portion having an image projecting lens for projecting onto a viewing surface, the image displayed on the display surface of said display panel assembly, and

a reconfigurable structure operably connecting said first and second housing portions, said reconfigurable structure being positionable about the base portion of said computer system when said portable light projecting device is being used in conjunction with said portable computer system, and permitting said first and second housing portions to be brought together into a compact arrangement when said portable light projecting device is being stored or transported.

84. The portable computer-based system of claim 83, wherein said light projection device which further comprises a light polarizing filter disposed in said first housing portion, for imparting a selected polarization state to visible light transmitted through said light aperture and onto said display panel assembly.